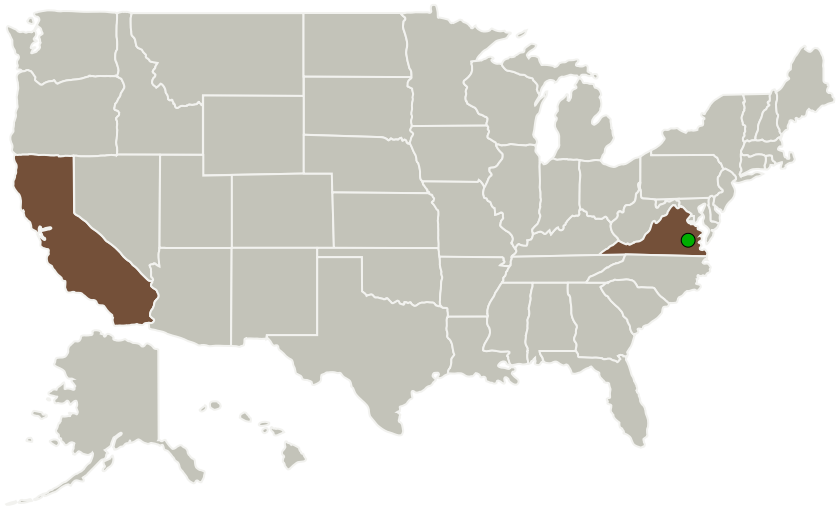
Reduced Order Nonlinear Dynamic Aeroservoelasticity, Phase I

Completed Technology Project (2016 - 2016)

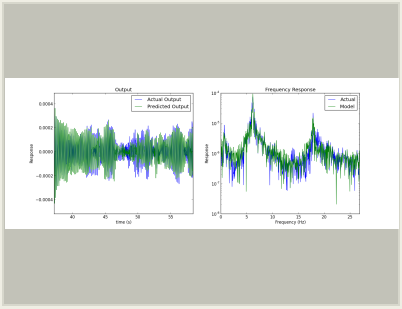
Project Introduction

M4 Engineering proposes to develop methods and software to generate reduced order nonlinear models of dynamic aeroserovelastic systems. The reduced order models will be based on a hybrid NARMAX-Wavelet model, in which the basic linear behavior and gentle nonlinearities in the dynamics are captured by a Nonlinear AutoRegressive, Moving Average with eXogenous inputs (NARMAX) model with polynomial behavior, and harsh nonlinearities that result localized discontinuities or transitions are captured with a Wavelet network. This approach will allow the system to capture the range of nonlinear dynamics encountered in complex DASE systems with very efficient models suitable for use early in the design cycle.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
M4 Engineering, Inc.	Lead Organization	Industry Women-Owned Small Business (WOSB)	Long Beach, California
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia



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Small Business Innovation Research/Small Business Tech Transfer

Reduced Order Nonlinear Dynamic Aeroservoelasticity, Phase I

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Primary U.S. Work Locations	
California	Virginia

Project Transitions

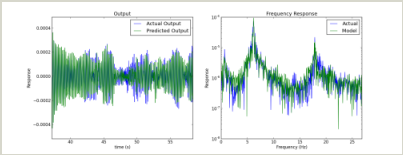
June 2016: Project Start

December 2016: Closed out

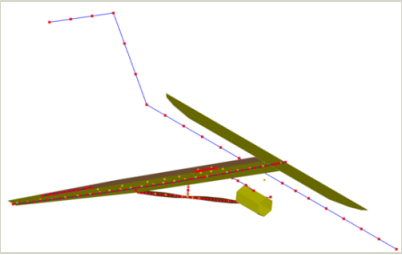
Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139898)*

Images



Briefing Chart Image
Reduced Order Nonlinear Dynamic Aeroservoelasticity, Phase I
(https://techport.nasa.gov/image/133602)



Final Summary Chart Image
Reduced Order Nonlinear Dynamic Aeroservoelasticity, Phase I Project Image
(https://techport.nasa.gov/image/136527)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
M4 Engineering, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

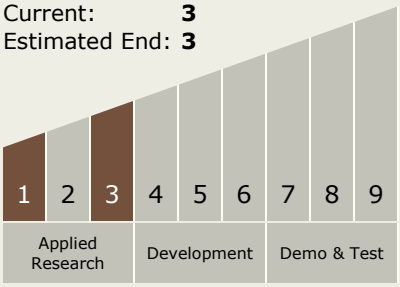
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Myles Baker

Technology Maturity (TRL)

Start: **1**
Current: **3**
Estimated End: **3**



Reduced Order Nonlinear Dynamic Aeroservoelasticity, Phase I

Completed Technology Project (2016 - 2016)

Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
  - TX11.1 Software Development, Engineering, and Integrity
    - TX11.1.7 Frameworks, Languages, Tools, and Standards

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System